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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/658,169	09/09/2003	Jae-Hoon Lee	YPL-0061	3342
23413	7590	05/08/2006	EXAMINER	
CANTOR COLBURN, LLP 55 GRIFFIN ROAD SOUTH BLOOMFIELD, CT 06002			NATALINI, JEFF WILLIAM	
			ART UNIT	PAPER NUMBER
			2858	

DATE MAILED: 05/08/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/658,169

Applicant(s)

LEE ET AL.

Examiner

Jeff Natalini

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 22 February 2006.
- 2a) ☒ This action is FINAL. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-3, 5-8 and 10-12 is/are pending in the application.
- 4a) Of the above claim(s) 12 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-3, 5-8, 10 and 11 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 09 September 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

**DETAILED ACTION**

***Election/Restrictions***

1. Newly submitted claim 12 is directed to an invention that is independent or distinct from the invention originally claimed for the following reasons:

Restriction to one of the following inventions is required under 35 U.S.C. 121:

- I. Claims 1-11, drawn to a method for detecting impedance of PCR solution after PCR events, classified in class 324, subclass 663.
- II. Claim 12, drawn to a method for measuring a change in impedance magnitude of charged reaction participants and detecting formation of the PCR product in real time, classified in class 435, subclass 6.

Inventions I and II are related as subcombinations disclosed as usable together in a single combination. The subcombinations are distinct if they do not overlap in scope and are not obvious variants, and if it is shown that at least one subcombination is separately usable. In the instant case, subcombination I has separate utility such as measuring a change in impedance magnitude of the PCR solution after a PCR cycle, where this measuring is performed in the absence of a probe for generating an electrical signal. As opposed to subcombination II, which has separate utility in determining formation of the PCR solution in real time by measuring impedance of charged reaction participants in the PCR. See MPEP § 806.05(d).

Applicant can state on the record that these inventions are obvious variants of each other, in which case examiner can use the prior art found for one invention and the statement by the applicant in a 35 USC § 103 rejection to reject the other invention.

Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, claim 12 is withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 10 and 11 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In regard to claim 10, it is unclear as to how this claim has been amended. As to what limitations of the original claim 10 remain or have been deleted and what new limitations have been added. As well as not being able to make out what limitations are presently included in the claim, there seems to be grammatical errors as well. The claim seems as it may even be missing some of what should be written after "measuring" on line 2, as it is the only word presently in line 2 of the claim. It is noted that claim 10 submitted on 8/19/05 was objected to for claiming allowable subject matter, and it still would be considered allowable if all the limitations of that claim 10 were presented in independent form.

Claim 11 is also rejected as it depends from rejected unclear claim 10.

***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-3 and 5-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Blackburn et al. (6264825) in view of Frazier et al. (6169394).

In regard to claims 1 and 2 Blackburn et al. discloses a method for detecting a polymerase chain reaction (PCR) product (col 88 line 5-7) comprising: performing PCR (col 87 line 60- col 88 line 15) in a PCR solution containing vessel (col 90 line 38-42);

Blackburn et al. lacks specifically the combination of providing a pair of electrodes in the PCR solution vessel wherein the pair of electrodes is connected to an impedance sensor, producing an electric field between the pair of electrodes, measuring a change in impedance magnitude of the PCR solution after a PCR cycle, wherein the measuring is performed in the absence of a probe for generating an electrical signal wherein (claim 2) neither of the pair of electrodes have an attached probe for generating an electrical signal that binds to the reactants or products of the PCR

Frazier et al. discloses a microelectric detector for providing conductivity or impedance measurements to particulate-containing fluids and biological materials (abstract). Includes that micromachining technology have been implemented in analyzing systems including polymerase chain reaction (col 2 line 48-col 3 line 6). A pair of electrodes without a probe for generating an electrical signal (fig 2a or 2b (46);

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no attached probe for containing an electrical signal is disclosed in the patent) are disposed on opposite sidewalls to create a detection zone where the sample will be (abstract), producing an electric field between the electrodes (col 4 line 15-21), and measuring a change in a dielectric property without a probe for generating an electrical signal (impedance; corresponding to claim 4) of the test sample (col 4 line 21-25; conductivity and impedance measurements are taken; no probe is disclosed in the patent to be present during measuring) after a PCR cycle (the impedance and other measurements taken are constantly taken as seen in the graphs from figures 5a-16, and thus would be taken over/after many cycles) none of the pair of electrodes contains an attached probe for generating an electrical signal that binds to reactants or products of the sample (fig 2a or 2b (46) does not show an attached probe to the electrodes that would produce an electrical signal binding reactants or products of the sample).

It would have been obvious to one with ordinary skill in the art at the time the invention was made for Blackburn et al. to incorporate the measuring method of Frazier et al. (that discusses PCR systems as being biological compositions) to perform an analysis of the PCR solution without the use of a attached probe for the electrodes or a probe for measuring in order to have an simple and inexpensive detection system to provide high resolution measurement of the electrical characteristics of biological systems (col 3 line 3-14).

In regard to claim 3, Blackburn et al. discloses where the PCR solution-containing vessel is a PCR tube (col 90 line 38-42).

In regard to claim 5, Blackburn et al. discloses an electric field is produced using an alternating current at a frequency of 1 Hz to 100MHz (col 84 line 11-14).

In regard to claim 6, Blackburn et al. discloses wherein an electric field is produced using an average AC voltage of 1mV to 10V (col 84 line 7-11).

In regard to claim 7, Blackburn et al. discloses wherein the PCR solution-containing vessel includes a PCR tube (col 90 line 38-42), and electrodes are installed to be opposite to each other at a predetermined height from a bottom of the PCR tube (fig 1E, electrodes (20) are opposite each other at a determined height).

In regard to claim 8, Blackburn et al. discloses wherein the PCR solution-containing vessel includes polymerization microchamber (fig 1 or 2 shows a chamber where polymerization occurs), where electrodes are installed at upper and lower sides of the microchamber (fig 2 shows upper side electrodes (12, 13) and lower side electrodes (17,16)).

### ***Response to Arguments***

4. Applicant's arguments filed 2/22/06 have been fully considered but they are not persuasive.

In respect to the arguments and amendments to claims 1-3 and 5-8 examiner has more clearly recited the rejection above. Applicant argues on pg 5 in the remarks that neither Blackburn nor Frazier teach or suggest a method in which "a PCR product could be detected during a PCR reaction by measuring the impedance magnitude of the PCR solution after a PCR cycle, wherein the measuring is performed in the absence of

a probe for generating an electrical signal", this claim language is not used to claim the invention in claims 1-3 and 5-8, specifically "a PCR product is detected during a PCR reaction", though Frazier teaches measuring the impedance of a variety of biological samples (which PCR is even talked about in the patent), and Blackburn teaches PCR, so the combination of the two with a proper motivation, which Frazier clearly teaches, is not out of the realm for someone with ordinary skill in the art. It is noted that PCR product is in the preamble of the claim (but the claim never ties the preamble down into the claimed subject matter), but the claim language does not state at which point in the method steps (also there is no specific order) a PCR product is determined (withdrawn claim 12, ties into the claim language how the PCR product is determined into the invention).

On pg 6 applicant argues that there is no teaching in Blackburn for detecting target analytes (example PCR product) without the use of compositions disclosed by Blackburn. This also is not in the claim language, as the claim has no reference to target analytes or PCR product without the use of an electrical signal. All that is claimed is that "impedance is measured without the use of a probe for generating an electrical signal". Further on pg 7, applicant argues that Frazier does not teach "that a PCR product could be detected electrically without having the PCR product bound to a capture ligand forming an assay complex comprising at least one electron transfer moiety", examiner has not tried to prove that Frazier teaches this, nor does that statement appear anywhere in the claims. Throughout pg 7 in the remarks applicant is arguing for things that are not specifically in the claimed subject matter, and the



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examiner must interpret only the claimed subject matter in the broadest reasonable way.

Applicant also points out that examiner states that Frazier discusses detection of PCR systems, what was meant by that statement is, that Frazier discloses performing measurement of biological systems, and in Frazier it is stated that PCR is a biological system, and with Blackburn combined with Frazier a PCR solution can be analyzed. Lastly applicant has stated that a skilled person would not have any expectation of success by combining the two references. Examiner disagrees as Blackburn teaches a PCR solution and detecting a PCR product, and it would be obvious to use the teaching in Frazier to analyze the solution (PCR) as it is a biological solution. Since Frazier is able to analyze a biological solution there would be an expectation of success in the combination of the two references.

### ***Conclusion***

5. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the

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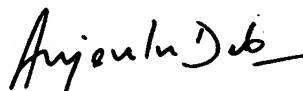
shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jeff Natalini whose telephone number is 571-272-2266. The examiner can normally be reached on M-F 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Diane Lee can be reached on 571-272-2399. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Jeff Natalini



ANJAN DEB  
PRIMARY EXAMINER